

A REVIEW OF THE PLESIOPID FISH GENUS *ASSESSOR*, WITH DESCRIPTIONS OF TWO NEW SPECIES

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[Received 24 October 1975. Accepted 11 May 1976. Published 15 October 1976.]

ABSTRACT

The plesiopid fish genus *Assessor* Whitley was formerly known on the basis of a single specimen of *A. macneilli* collected at Hayman Island, Queensland. In the present paper the range of this species is extended, including widespread localities on the Great Barrier Reef and an observation record from New Caledonia. In addition, two new species are described, *A. flavissimus* from the northern Great Barrier Reef and *A. randalli* from the Ryukyu Islands. Important characters for separating the species of *Assessor* include coloration, scalation (particularly of the cheek and above the lateral-line), and counts for the gill rakers, soft dorsal rays, and soft anal rays. A key to the species is included and detailed observations are presented on the reproductive habits of *A. macneilli*.

INTRODUCTION

Whitley (1935) described *Assessor macneilli* as a new genus and new species of plesiopid fish from a single specimen, 45 mm in standard length collected at Hayman Island, Queensland in 1934. It has subsequently been taken by us at various localities on the Great Barrier Reef from Lizard Island, north of Cooktown, as far south as the Capricorn Group near the southern extremity of the Barrier Reef. In addition, it was observed by the senior author off Noumea, New Caledonia. During June and July 1972, the senior author collected reef fishes at Pixie Reef, off Port Douglas, Queensland. These included several specimens of *A. macneilli* and a bright yellow *Assessor*

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which was undescribed. Additional specimens were procured on subsequent trips to the northern Barrier Reef in late 1972 and 1974. Dr John E. Randall kindly sent 13 specimens of *A. "macneilli"* which he collected in 1968 at Ryukyu Islands, off southern Japan. These proved to be another undescribed species. The present paper includes a review of *Assessor* with descriptions of the new species and detailed observations of the unusual habit of oral egg incubation exhibited by *A. macneilli*.

We have deposited specimens of the new species in the Australian Museum, Sydney (AM), Bernice P. Bishop Museum, Honolulu (BPBM), British Museum (Natural History), London (BM[NH]), United States National Museum of Natural History, Washington, D.C. (USNM), and the Western Australian Museum, Perth (WAM).

GENUS ASSESSOR

Assessor Whitley, 1935. Rec. Austr. Mus., 19(4): 231 (type species, *A. macneilli* Whitley by original designation).

Dorsal rays XI, 8 to 10½ (rarely with XII spines); anal rays III, 9½ to 10½; pectoral rays 14 to 16; pelvic rays I, 4; tubed scales in lateral-line 16 to 23 + 1 to 9; gill rakers on first branchial arch 23 to 36.

Body elongate, the depth 3.0 to 3.6 in standard length, and moderately compressed, the width at gill opening 1.9 to 2.4 in depth; head short, 3.2 to 3.8 in standard length; snout short, obtuse, 4.4 to 5.8 in head length; eye large, 2.5 to 3.6 in head, near upper profile; interorbital space convex, the bony width 3.2 to 5.1 in head; caudal peduncle depth about equal to its length, 1.5 to 1.8 in head.

Mouth terminal, oblique (about 45°), the maxillary scaled and reaching to beneath posterior part of eye; teeth of jaws villiform, in a single row except multiserial at front of jaws; a few enlarged teeth on each side of median symphysis at front of lower jaw; upper jaw with edentulate indentation at median symphysis; palatines with band of small granular teeth; vomer toothless.

Six branchiostegal rays; gill membranes united across isthmus; posterior nostrils in a short tube; a series of relatively large pores around eye and on top of head; most of body scales finely ctenoid, those of head either cycloid or finely ctenoid; lateral-line with series of tubes running along back to below base of soft dorsal fin, interrupted and then continuing with a few tubed scales along middle of caudal peduncle; low scaly sheath on all fins except pelvics.

Dorsal spines gradually increasing in length posteriorly, last spine 1.9 to 3.2 in head length; longest soft dorsal ray 0.9 to 1.8 in head length; origin of

anal fin below middle of dorsal fin; caudal fin forked; pectoral fins rounded, the longest ray 0.9 to 1.1 in head length; pelvic fins pointed, their origin directly below base of pectorals, the longest ray 0.8 to 1.2 in head length.

Table 1. Fin ray and gill raker counts for species of *Assessor*.

Species:		<i>A. macneilli</i>	<i>A. flavissimus</i>	<i>A. randalli</i>
Soft Dorsal Rays	7		1	
	8		1	
	9	2		1
	9½	14		2
	10		2	9
	10½		18	1
Soft Anal Rays	9			
	9½	16	1	1
	10		1	11
	10½		20	1
Gill Rakers:				
Upper Limb	7		12	
	8		10	12
	9			1
	10	3		
	11	5		
	12	8		
	+			
Lower Limb	16		1	1
	17		13	8
	18		5	4
	19		3	
	20			
	21			
	22			
	23	13		
	24	3		

KEY TO THE SPECIES OF ASSESSOR

- 1a. Gill rakers on lower limb of first branchial arch 23 to 24, total rakers 33 to 36; cheek (preopercle) scales cycloid; colour primarily dark brown to black, blue in life (Great Barrier Reef, New Caledonia) *macneilli* Whitley

- 1b. Gill rakers on lower limb of first branchial arch 16 to 19, total rakers 23 to 27; cheek (preopercle) scales finely ctenoid, colour either brown or pale tan, blue or yellow in life 2
- 2a. Colour generally brown to dark brown, blue in life; scales above lateral-line finely ctenoid; 3rd or 4th from last dorsal and anal ray usually the longest; width of bony interorbital 3.2 to 3.7 in head length (Ryukyu Islands) *randalli n.sp.*
- 2b. Colour generally pale tan, yellow in life; scales above lateral-line cycloid; penultimate soft dorsal and anal ray usually the longest; width of bony interorbital 4.1 to 5.1 in head length (northern Great Barrier Reef) *flavissimus n.sp.*

Assessor macneilli Whitley
(Figs. 1, 2 and 3; Tables 1 and 2)

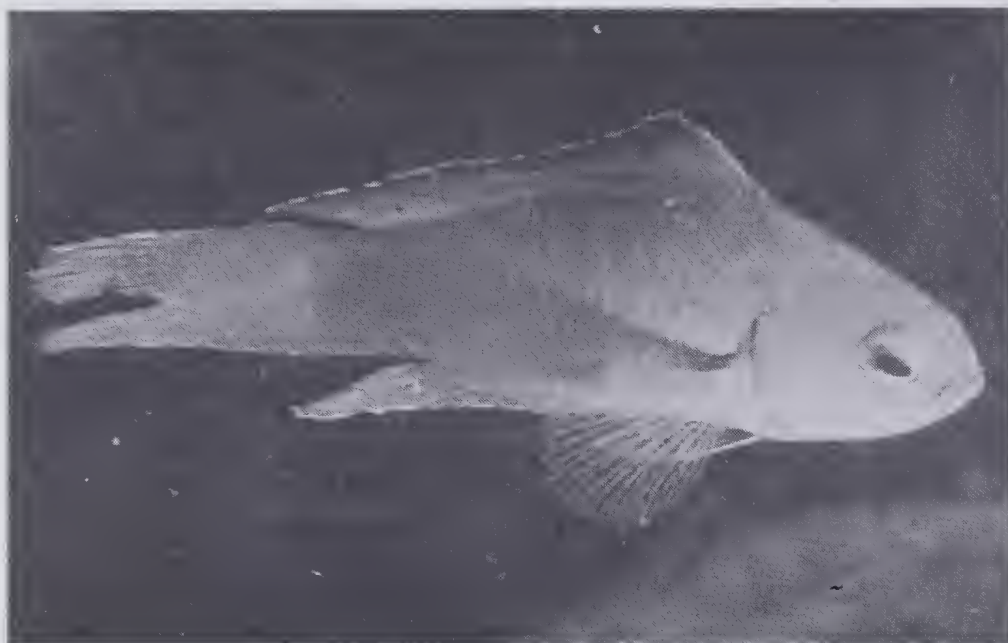


Fig. 1. *Assessor macneilli*, approximately 40 mm SL, photographed in 4 metres at One Tree Island. The photo has been inverted as the fish was swimming upside down.

Assessor macneilli Whitley, 1935. Rec. Austr. Mus., 19(4): 231 (type locality, Hayman Island, Whitsunday Passage, Queensland.)

Diagnosis

The following counts and proportional measurements are from 16 specimens, 37.2 to 47.5 mm in standard length.

Dorsal rays XI,8½ to XI,9½; anal rays III,9½; pectoral rays 15; pelvic rays I,4; tubed sclaes in first part of lateral-line 16 to 21, in second part 1 to 7; gill rakers 10 to 12 + 23 to 24, total rakers 33 to 36.

Greatest body depth 3.0 to 3.3; head 3.2 to 3.4, both in the standard length. Snout 4.7 to 5.2; eye 3.0 to 3.6, bony interorbital 3.9 to 4.3; least depth of caudal peduncle 1.6 to 1.7, length of pectoral fins 0.9 to 1.0, of pelvic fins 0.9 to 1.1, of caudal fin 0.6 to 0.7, all in the head length.

Colour in life: head, body, and all fins except pectorals dark blue; narrow pale blue margin on dorsal, anal, and pelvic fins; pectoral fins more or less translucent.

Colour in 70% ethanol: head, body, and all fins except pectorals dark brown or black; pectoral fins pale.

Remarks

A. macneilli is clearly distinguished from the other members of the genus by the combination of characters given in the key.

The authors have made close observations of *A. macneilli* at One Tree Island and at various places on the northern Great Barrier Reef between Green Island and Lizard Island. The species dwells in caves, crevices, and under ledges, always in areas of subdued light at depths ranging from about two to three metres to at least 15 metres. It commonly forms aggregations which may include more than 100 individuals. The fish are frequently seen swimming upside down near the roof of the cavern, apparently orienting dorsally to the lighter bottom which is often composed of sand or fine silt. The gut contents of eight specimens of *A. macneilli* and *A. flavissimus* collected in the same cave at Spur Reef, off Port Douglas, Queensland contained primarily copepods, ostracods, and amphipods.

During September 1974 the junior author collected three live adult specimens, about 32 to 38 mm standard length, at One Tree Island. These were transported to Sydney and placed in a filtered (600-800 litres per hour) aquarium with a capacity of 300 litres. There were nine other fishes in the tank including two *Nemateleotris magnifica*, *Canthigaster* sp., *Doryrhamphus negrosensis*, *Centropyge flavicauda*, *Coris* sp., *Cleidopus gloriamaris*, and *Labropsis* sp. Several months later in mid-November, at the onset of warm summer weather, one of the *Assessor* suddenly exhibited an enlarged gular swelling. Closer inspection revealed the presence of a large

egg mass in the mouth cavity. During the next several months spawning occurred at regular intervals. A record for several of these is shown in Table 2. The same individual, 35.6 mm standard length, orally incubated the eggs in every case. Subsequent preservation of this fish and examination of the gonads revealed it to be a male. The egg mass which it was incubating contained 216 spherical eggs approximately one mm in diameter.

In spite of intensive observation, the actual spawning was never seen. Perhaps it occurs during the night. When they first appear in the male's oral cavity, the eggs are semi-transparent, slightly milky in colour. Several days later they become more transparent as the eyes of the embryo begin to develop.

During incubation the male swims out in the open and behaves more or less normally except it does not appear to feed. No obvious behavioural interactions were observed between the male parent and the other fishes in the tank, including the two *Assessor*. The incubation period generally lasts for 15-16 days. Several days prior to hatching the male's mouth is continually held open and the eggs are shifted back and forth at intervals ranging between two to eight minutes.

Hatching was not witnessed. Evidently it takes place at night as the fry were usually discovered in the early morning. The larvae, which swim close to the surface, are mostly transparent and four to five mm in total length. Unfortunately they did not live more than a few hours.



Fig. 2. *Assessor macneilli*, 35.6 mm SL, male with egg mass in oral cavity.

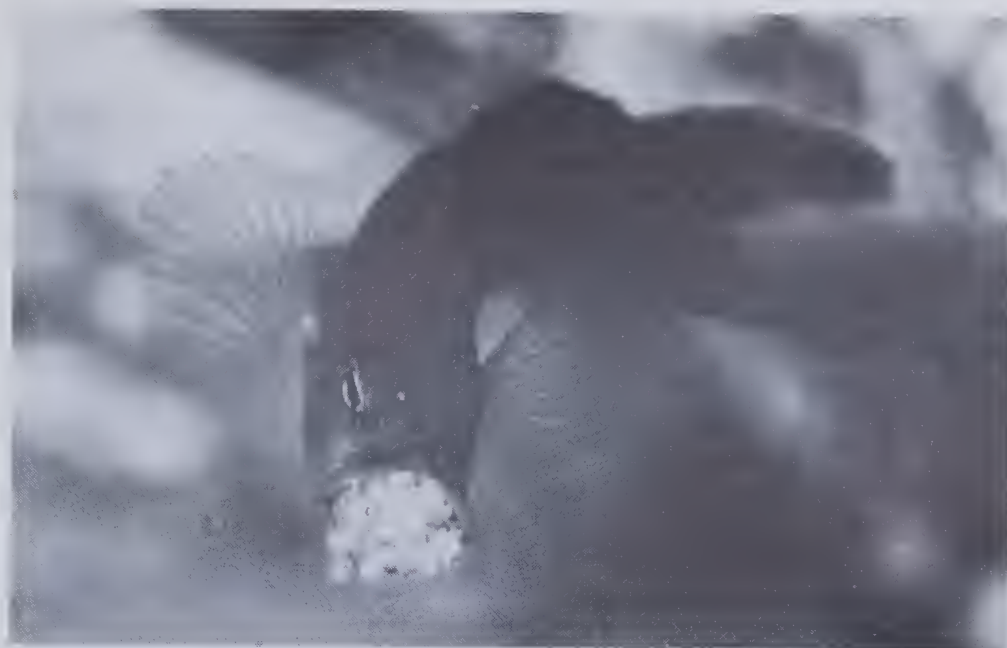


Fig. 3. Head-on view of male *Assessor macneilli* showing egg mass during last stages of incubation.

Material examined

Eighty one specimens, 24.0-50.0 mm SL, all except the holotype collected on the Great Barrier Reef, Queensland, Australia: AM IA.6383 (holotype), 45 mm SL, Hayman Island, Whitsunday Passage, Queensland; WAM P24932, 26 specimens, 43.0-46.0 mm SL, One Tree Island; WAM P24756, 54 specimens, 24.0-50.0 mm SL, Lizard Island.

Table 2. Record of aquarium spawnings of *Assessor macneilli*.

Eggs First Appear in Male's Oral Cavity	Hatching Date	Incubation Period (days)
7 December 1974	21-22 December	14-15
24 December 1974	8-9 January	15-16
10 January 1975	25 January	15
26 January 1975	11 February	16
27 February 1975	4 March	(collected)

Assessor randalli, n.sp.

(Fig. 4; Tables 1 and 3)



Fig. 4. *Assessor randalli*, holotype, 32.5 mm SL, Ishigaki, Ryukyu Islands (photo by J.E. Randall).

Holotype

BPBM 19261, 32.5 mm SL, collected with rotenone at Ishigaki, Ryukyu Islands in 6 to 23 metres by J. Randall, A. Banner, P. Helfrich, and W. Newhouse on 22-24 May 1968.

Paratypes

(Same collecting data as holotype.) AM I.18503-001, 2 specimens, 31.7 and 39.7 mm SL; BPBM 11542, 4 specimens, 31.2-40.0 mm SL, USNM 214832, 3 specimens, 33.5-40.0 mm SL; WAM P25419-001, 3 specimens, 37.2-40.1 mm SL.

Description

Proportional measurements of the holotype and selected paratypes are presented in Table 3. Certain counts are summarised in Table 1. The range of counts and proportional measurements for the paratypes appear in parentheses in the following description.

Dorsal rays XII,10 (XI,9 to 10½); anal rays III,10 (III,9½ to 10½); pectoral rays 15; pelvic rays I,4; tubed scales in first part of lateral-line 17 (19 to 22), in second part 5 (5 to 7); gill rakers 8 + 17 (8 to 9 + 16 to 18), total rakers 25 (25 to 26).

Body elongate, the depth 3.1 (3.2 to 3.5) in standard length, and compressed, the width 2.2 (1.9 to 2.3) in depth (this measurement taken at level of gill opening); head 3.3 (3.3 to 3.8) in standard length; snout 4.9 (4.6 to 5.2) in head; eye 2.6 (2.5 to 2.8) in head; interorbital space convex, the bony width 3.3 (3.2 to 3.7); least depth of caudal peduncle 1.5 (1.2 to 1.5) in head.

Maxillary reaching a vertical at posterior part of eye; mouth oblique, opening dorsally, the anterior end approximately horizontal with middle of pupil; upper and lower lip relatively thin, about $\frac{1}{3}$ pupil width; upper and lower jaw with row of villiform teeth, becoming multiserial at front of jaws; teeth of lower jaw slanted posteriorly and somewhat depressible; upper jaw with edentulate indentation at median symphysis; palatines with tiny granular teeth; vomer toothless.

No spines on opercle or preopercle; upper edge of gill opening at level of top of eye; a tubular nostril on each side of snout about midway between eye and tip of snout; a pair of large pores (posterior nares?) just behind tubular nostril; other head pores in several series, a group of five pores on the dentary, 22-24 circumorbital pores, a mid-interorbital pore, a small pore on each side of the snout tip, 8-10 pores on rear edge of preopercle, and several pores behind eye in nape region and upper opercle, which are difficult to detect because of the poor condition of the type specimens.

Head and body entirely scaled except tip of snout, area around nostrils, lips, and isthmus; scales relatively large, about 26 vertical rows; 10 to 11 horizontal scale rows at level of anal fin origin; scales on body and most of head finely ctenoid, those of antero-dorsal part of head cycloid; maxillary scaled; 3-4 transverse scale rows on cheek; low scaly sheath present at base of all fins except pelvics.

Origin of dorsal fin level with pectoral fin base; dorsal spines slender, but pungent, the first short, less than $\frac{1}{4}$ length of second dorsal spine, remaining spines gradually increasing in length posteriorly; 6th to 8th soft dorsal rays the longest, their length 0.9 to 1.3 in the head length; all except first three soft rays branched.

Caudal forked with 13 to 15 branched rays; pectorals rounded; the middle rays longest, 1.0 to 1.1 in the head length; pectoral rays branched except two uppermost and lowermost rays; origin of pelvic fins directly below pectoral base; pelvics pointed, the outermost soft ray the longest, 0.8 to 1.1 in the head length.

Origin of anal fin level with origin of soft dorsal fin; first anal spine short, slightly greater than $\frac{1}{4}$ length of second; second anal spine about 1.2 to 1.4 in length of third; 7th soft anal ray the longest, its length 1.4 to 1.9 in the head length.

Colour in life: head, body, and fins dark blue.

Table 3. Measurements of the holotype and selected paratypes of *Assessor randalli*.
(Measurements in millimetres)

Morphometric measurement	Holotype		Paratypes			
	BPBM 19261	USNM 214832	WAM P25419-001	BPBM 11542	USNM 214832	BPBM 11542
Standard length	32.5	40.0	37.2	39.5	33.5	31.2
Greatest body depth	10.5	11.5	11.5	11.5	10.3	9.8
Greatest body width	4.8	6.0	5.0	5.8	4.8	4.5
Head length	9.8	11.5	11.0	10.5	10.2	9.5
Snout length	2.0	2.2	2.2	2.3	2.0	1.9
Eye diameter	3.7	4.4	4.0	4.1	4.0	3.8
Interorbital width	3.0	3.6	3.0	3.0	3.0	2.6
Caudal peduncle depth	5.9	6.8	6.5	7.0	6.0	5.5
Caudal peduncle length	6.5	8.3	7.5	9.0	7.7	7.0
Snout to origin of dorsal fin	11.0	12.5	12.0	13.0	11.0	10.0
Snout to origin of anal fin	19.5	24.2	23.9	23.5	20.3	18.5
Snout to origin of pelvic fin	10.6	12.6	11.8	12.2	10.9	9.5
Dorsal fin base length	17.0	19.7	19.2	20.0	16.0	15.1
Anal fin base length	6.8	8.8	7.1	9.0	6.5	6.2
Length of pectoral fin	10.0	11.0	10.0	11.0	9.0	8.5
Length of pelvic fin	9.2	11.5	10.0	12.5	9.2	9.2
Length of longest dorsal spine	4.5	4.6	4.9	5.0	4.5	3.7
Length of longest soft dorsal ray	8.0	9.2	10.0	11.3	8.5	7.5
Length of longest soft anal ray	7.5	9.0	8.5	9.8	7.8	6.5
Length of caudal fin	11.2	15.0	13.0	15.5	13.0	10.0

Colour in 70% ethanol: head and body mostly brown, darker on paratypes; pelvics and median fins dark brown; pectoral fins pale brown.

Remarks

The only known specimens were collected from caves at Ishigaki, Ryukyu Islands.

A. randalli resembles *A. macneilli* in general appearance and coloration. However, the two species differ significantly with respect to the gill raker count, and scalation of the cheek and the portion of the body above the lateral-line. The scales in this region are cycloid in *A. macneilli* and ctenoid in *A. randalli*.

It is named *randalli* in honour of Dr John E. Randall, Curator of Fishes at the Bishop Museum, Honolulu and the collector of the type series.

Assessor flavissimus, n. sp.

(Fig. 5; Tables 1 and 4)



Fig. 5. *Assessor flavissimus*, approximately 35 mm SL, photographed in 12 metres at Spur Reef, Queensland (photo inverted).

Holotype

WAM P25322-001, 38.8 mm SL, collected with rotenone at Pixie Reef, Great Barrier Reef, off Cairns, Queensland in 12 metres by G. Allen on 3 July 1972.

Paratypes

AM I.18460-001, 4 specimens, 25.1-36.8 mm SL, collected with rotenone at Lizard Island, northern Great Barrier Reef, Queensland in 5 metres by

G. Allen on 4 May 1974; BM(NH) 1975.8.27.1-3, 3 specimens, 26.0-38.0 mm SL, same data as preceding specimens; BPBM 18861, 3 specimens, 35.0-45.5 mm SL, collected with holotype; USNM 214680, 2 specimens, 38.0 and 40.7 mm SL, collected with holotype; WAM P25323-001, 8 specimens, 26.0-37.8 mm SL, collected with rotenone at Lizard Island, Northern Great Barrier Reef, Queensland in 5 metres by G. Allen on 4 May 1974.

Description

Proportional measurements of the holotype and selected paratypes are presented in Table 4. Certain counts are summarised in Table 1. The range of counts and proportional measurements for the paratypes appear in parentheses in the following description.

Dorsal rays XI,10 (XI,8 to 10½); anal rays III,10½ (III,9½ to 10½); pectoral rays 15 (14 to 16); pelvic rays I,4; tubed scales in first part of lateral-line 21 (17 to 23), in second part 8 (3 to 9); gill rakers 8 + 19 (7 to 8 + 16 to 19), total rakers 27 (23 to 27).

Body elongate, the depth 3.5 (3.4 to 3.6) in standard length, and compressed, the width 2.0 (2.0 to 2.3) in depth (this measurement taken at level of gill opening); head 3.6 (3.3 to 3.8) in standard length; snout 5.1 (4.4 to 5.8) in head; eye 2.8 (2.6 to 3.2) in head; interorbital space convex, the bony width 5.1 (4.1 to 4.5); caudal peduncle depth about equal to its length, 1.6 (1.5 to 1.8) in head.

Maxillary reaching a vertical at posteriormost part of eye; mouth oblique, opening dorsally, the anterior end approximately horizontal with middle of pupil; upper and lower lip relatively thin, about ½ pupil width; upper and lower jaw with row of villiform teeth, becoming multiserial at front of jaws; teeth of lower jaw slanted posteriorly and somewhat depressible; upper jaw with edentulate indentation at median symphysis; palatines with tiny granular teeth; vomer toothless.

No spines on opercle or preopercle; upper edge of gill opening at level of top of eye; a tubular nostril on each side of snout about midway between eye and tip of snout; a pair of large pores (posterior nares?) just behind tubular nostril; other head pores in several series, a group of five pores on the dentary, 22 circumorbital pores, a mid-interorbital pore, a small pore on each side of the snout tip, 8-10 pores on rear edge of preopercle, and about 10 pores behind eye in nape region and upper opercle.

Head and body entirely scaled except tip of snout, area around nostrils, lips, and isthmus; scales relatively large, about 27 vertical rows; scales on most of body and head finely ctenoid, those above lateral-line and on dorsal part of head cycloid; maxillary scaled; 3-4 transverse scale rows on cheek; low scaly sheath present at base of all fins except pelvics.

Table 4. Measurements of the holotype and selected paratypes of *Assessor flauissimus*.
(Measurements in millimetres)

Morphometric measurement	Holotype		BPBM 18861	USNM 214680	Paratypes	
	WAM P25322-001				BPBM 18861	WAM P25323-001
Standard length	38.8		45.5	40.7	35.0	26.0
Greatest body depth	11.1		12.7	11.6	10.2	7.5
Greatest body width	5.6		5.6	5.6	4.4	3.8
Head length	10.7		12.9	11.6	9.1	8.0
Snout length	2.1		2.5	2.0	2.0	1.8
Eye diameter	3.8		4.0	3.9	3.5	2.8
Interorbital width	2.1		3.1	2.7	2.2	1.8
Caudal peduncle depth	6.7		7.8	7.2	5.9	4.6
Caudal peduncle length	6.7		7.8	7.0	6.3	5.2
Snout to origin of dorsal fin	12.0		14.0	12.4	11.0	8.3
Snout to origin of anal fin	24.3		26.8	25.0	20.3	15.8
Snout to origin of pelvic fin	11.0		13.2	12.3	10.0	7.8
Dorsal fin base length	21.6		25.0	21.3	17.5	13.2
Anal fin base length	9.0		11.5	8.6	7.6	6.5
Length of pectoral fin	10.1		12.6	11.0	9.3	7.0
Length of pelvic fin	10.4		11.3	10.8	8.5	7.8
Length of longest dorsal spine	5.0		5.2	4.2	4.2	2.5
Length of longest soft dorsal ray	8.5		9.7	8.2	7.0	4.8
Length of longest soft anal ray	7.4		9.5	7.5	5.6	4.3
Length of caudal fin	16.5		17.5	*	14.7	9.5

* damaged

Origin of dorsal fin level with pectoral fin base; dorsal spines slender, but pungent, the first short, less than $\frac{1}{2}$ length of second dorsal spine, remaining spines about equal or gradually increasing in length posteriorly; penultimate soft dorsal ray or one just anterior to this the longest, the length 1.3 to 1.8 in the head length; all except first three soft rays branched.

Origin of anal fin level with origin of soft dorsal fin; first anal spine short, about $\frac{1}{2}$ length of second; second anal spine about 1.3 to 1.4 in length of third; penultimate soft anal ray the longest, its length 1.4 to 1.9 in the head length.

Caudal forked with 13 to 14 branched rays; pectorals rounded; the middle rays longest, 1.0 to 1.1 in the head length; pectoral rays branched except two uppermost and lowermost rays; origin of pelvic fins directly below pectoral base; pelvics pointed, the outermost soft ray the longest, 1.0 to 1.2 in the head length.

Colour in life: head, body, and fins mostly bright yellow except oblique red-orange stripe extending from rear corner of eye to upper edge of gill opening and submarginal red-orange stripe at distal edge of dorsal and anal fins, these fins bordered with narrow black margin.

Colour in 70% ethanol: head and body mostly light brown or tan; faint pale stripe behind eye extending obliquely to upper edge of gill opening; dorsal and anal fins slightly dusky with narrow submarginal pale band, and black distal margin; remainder of fins yellowish.

Remarks

This species was observed at Lizard Island and off Cairns at Pixie, Hastings, and Spur Reefs. It occupies the same habitat and exhibits the same behaviour as *A. macneilli*. The two species are frequently found together in the same cavern. *A. macneilli* generally appears to be more numerous, but large numbers of *A. flavissimus* were seen at Spur and Hastings Reefs.

In addition to the characters outlined in the key, this species differs from the sympatric *A. macneilli* in the configuration or profile of the dorsal fin of live individuals. Although similar in shape for both species, the anterior part of the dorsal is usually held erect in *A. macneilli* (Fig. 1) and tapers in height posteriorly, while in *A. flavissimus* (Fig. 5) the fin gradually increases height and the posteriormost part is generally held erect.

This species is known only from the northern Great Barrier Reef, approximately from Euston Reef off Cairns, northward to Lizard Island.

It is named *flavissimus* with reference to the striking yellow coloration.

ACKNOWLEDGEMENTS

We thank Dr Frank Talbot, former Director of the Australian Museum, and the Board of Trustees of that institution for allowing us to utilise the museum field stations at One Tree and Lizard Islands. The senior author expresses his gratitude to Dr Walter A. Starck II, who assisted with the 1972 collections at Pixie Reef and provided his research ship *El Torito* for these activities. Dr John E. Randall kindly provided specimens and a photograph of *A. randalli*.

REFERENCE

WHITLEY, G.P. 1935—Studies in ichthyology. No.9. Rec. Austr. Mus., 19(4): 215-250.